

# On Service Composition Algorithm for Open Marketplaces of Network Services

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# Outline

- Introduction
  - ChoiceNet Architecture
- Planner
  - Semantics
  - Economy Plane and Use (Data) Plane
  - Example
- Future Work

# Introduction

- Motivation : Why ChoiceNet?
  - Innovation at the core network
- What is an Open Marketplace and why do we need it?
  - Allow economics and technology interaction
  - Foster a free and open society
- What do we hope to accomplish?
  - Provide Choice while selecting network services

# Analogy : Google Flight Planner

☰ Flights

Round trip One way Multi-city

Economy 1 adult

RDU Raleigh +

SFO San Francisco +

Sat, February 13 ◀ ▶

[Add return date](#)

↓

## Choose a flight

Sort by price + best

Clear

Dep.
Arr.
3pm - 7:59pm

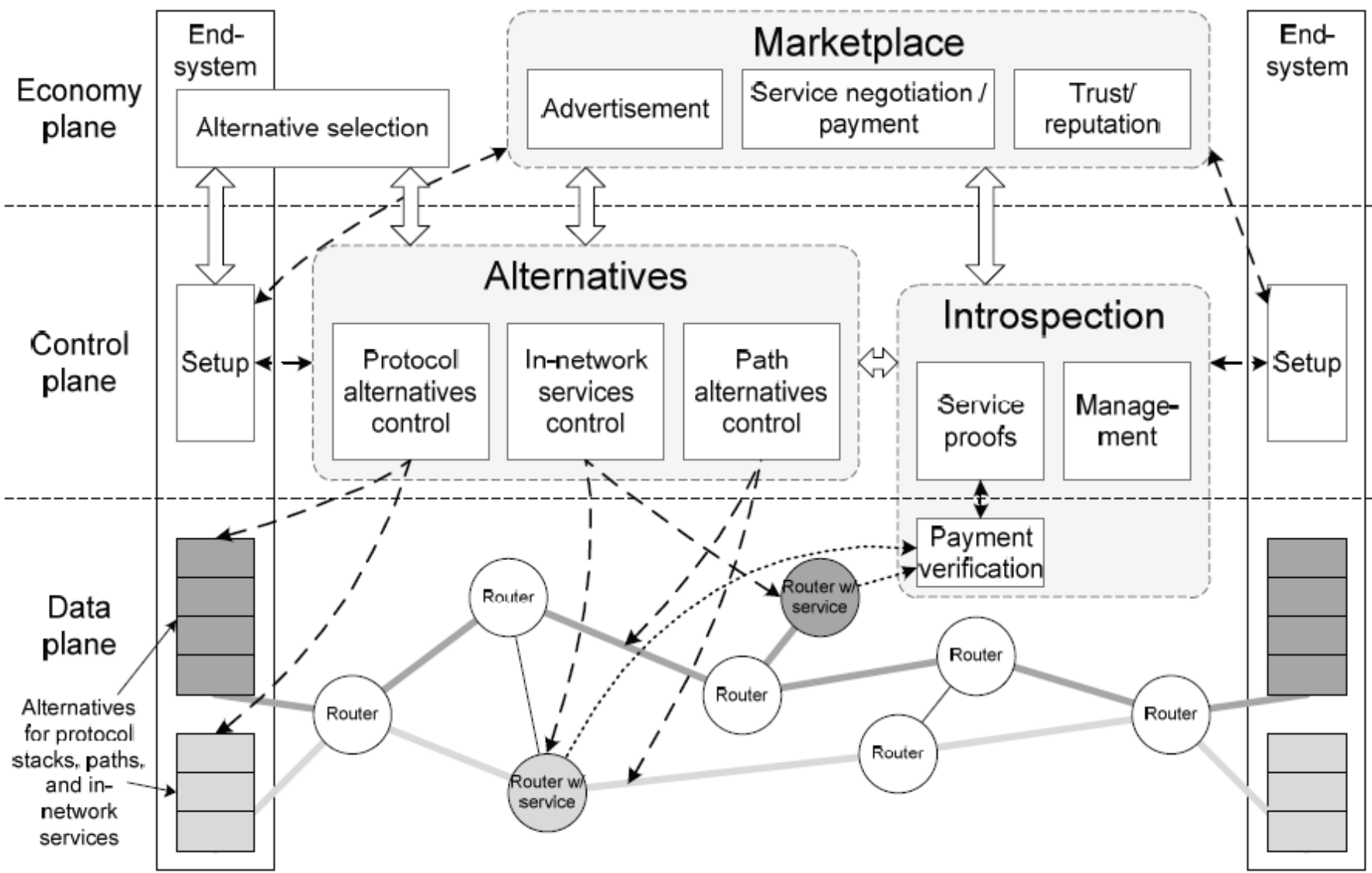
Prices one way. [Additional bag fees](#) may apply.

Prices are not available for: Southwest. Flights with unknown prices are at the end of the list.

**Best flights** [Learn more](#)

<b>\$217</b> <small>one way</small>		7:55 pm – 9:49 am <sup>+1</sup> <small>American</small>	📶 16h 54m	2 stops <small>CLT, PHX</small>
<b>\$243</b> <small>one way</small>		6:30 pm – 10:24 am <sup>+1</sup> <small>American</small>	📶 18h 54m	1 stop <small>10h 14m in MIA</small>
<b>\$260</b> <small>one way</small>		3:37 pm – 10:31 pm <small>American</small>	📶 9h 54m	2 stops <small>DFW, PHX</small>
<b>\$267</b> <small>one way</small>		6:30 pm – 12:55 am <sup>+1</sup> <small>American</small>	📶 9h 25m	1 stop <small>43m in MIA</small>
<b>\$321</b> <small>one way</small>		5:55 pm – 11:59 pm <small>Alaska · American</small>	📶 9h 04m	1 stop <small>1h 15m in SEA</small>
<b>\$330</b> <small>one way</small>		3:39 pm – 11:24 pm <small>Delta · Gojet Airlines DBA Delta</small>	📶 10h 45m	1 stop <small>2h 01m in JFK</small>
<b>\$413</b> <small>one way</small>		4:01 pm – 9:09 pm <small>United · Skywest DBA United Ex</small>	📶 8h 08m	1 stop <small>1h 01m in DEN</small>
<b>\$416</b> <small>one way</small>		3:37 pm – 8:39 pm <small>American</small>	📶 8h 02m	1 stop <small>55m in DFW</small>
<b>\$560</b> <small>one way</small>		5:00 pm – 9:47 pm <small>Delta</small>	📶 7h 47m	1 stop <small>39m in ATL</small>

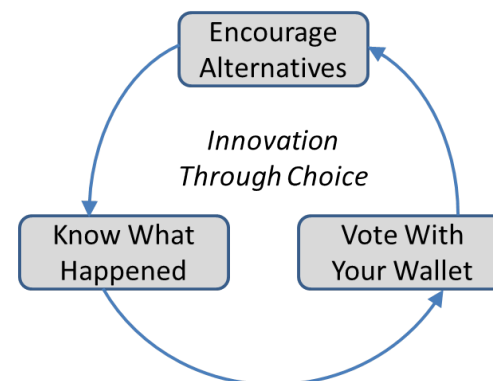
# CHOICENET ARCHITECTURE



# ChoiceNet Principles and Features

- Foundation Principles of the Architecture

- Encourage Alternatives
- Know What Happened
- Vote With Your Wallet

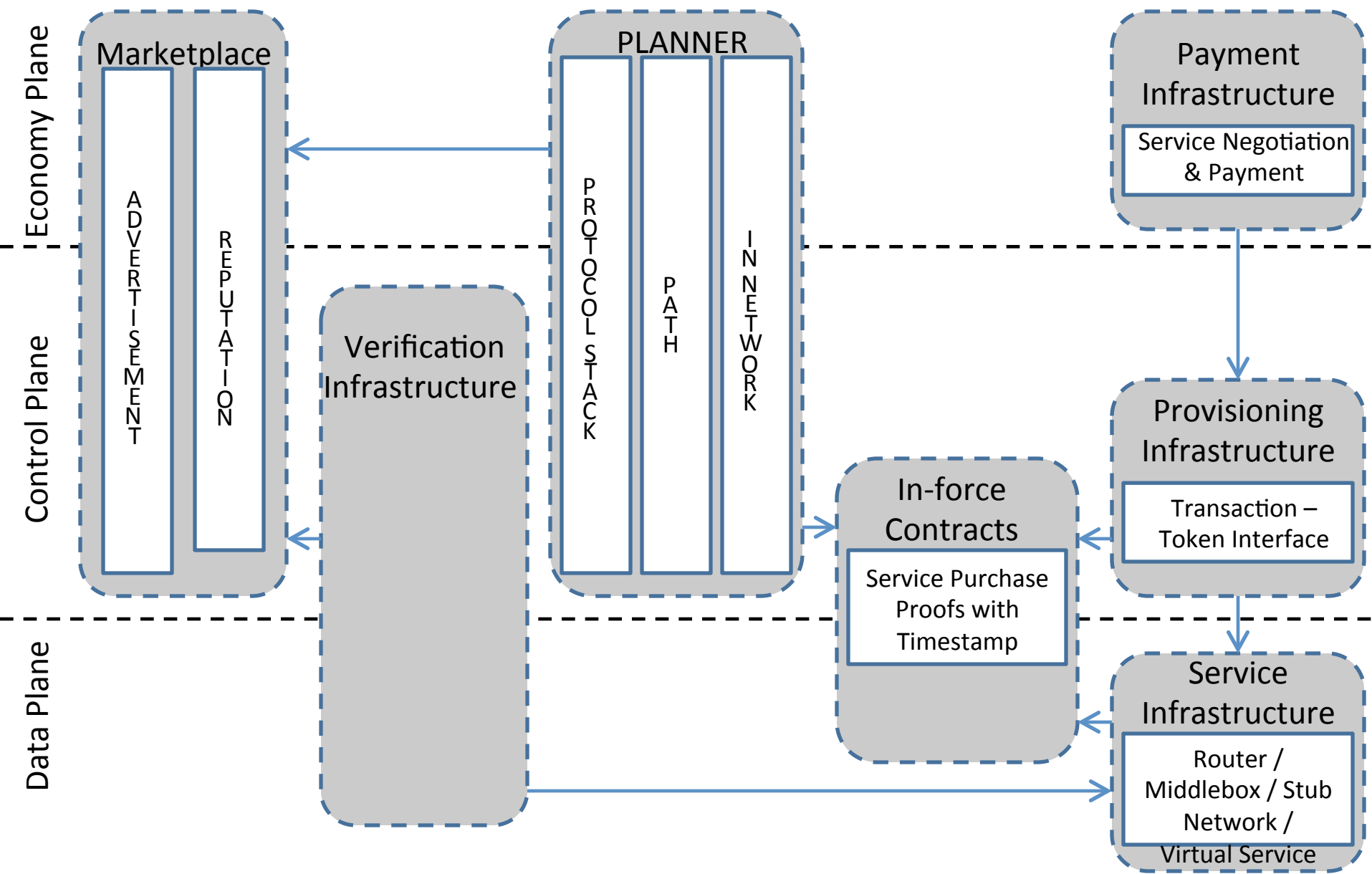


- Features which reflect the Principles

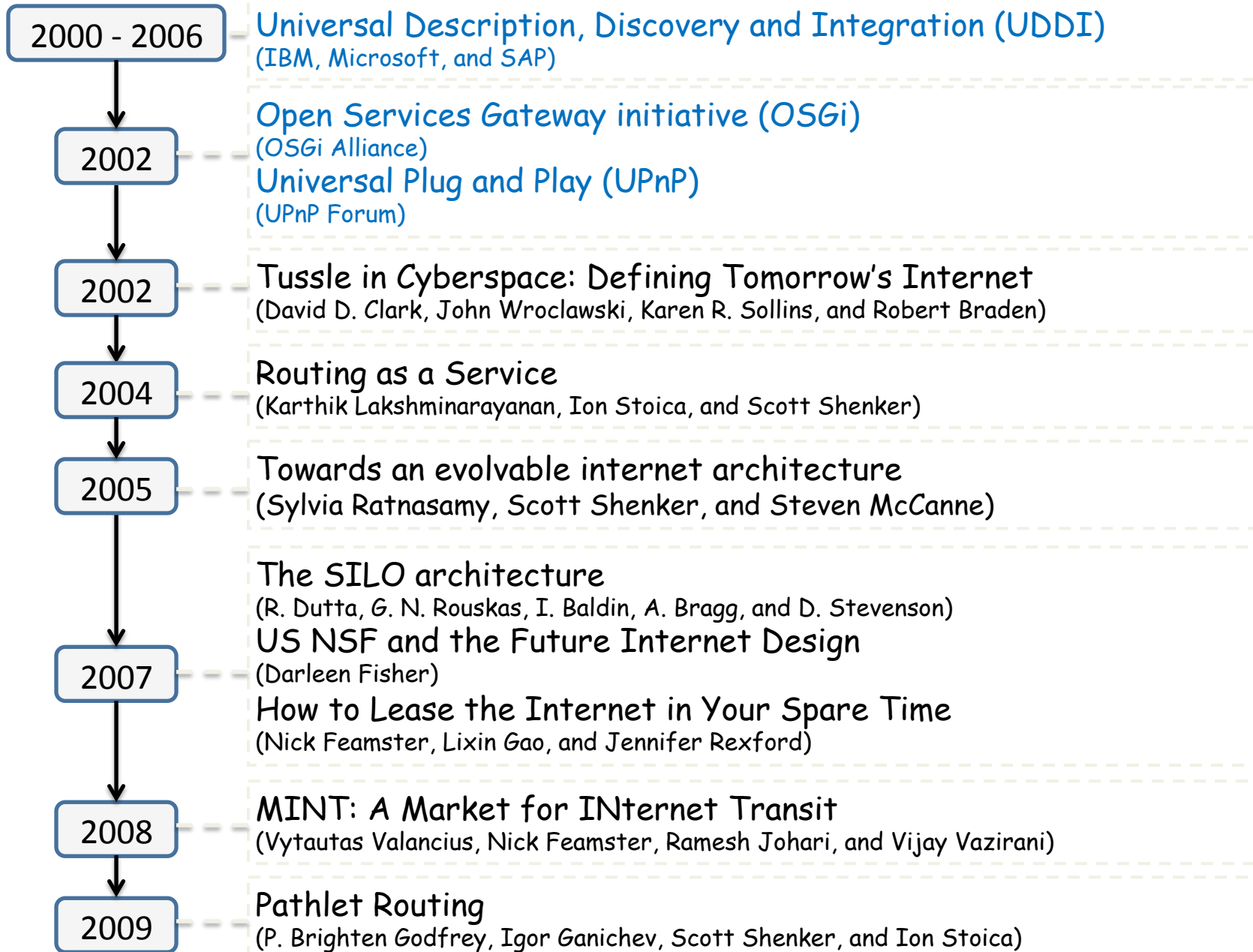
- Level Playing Field
- Verification and Accountability
- Reward Selectively



# CHOICENET ARCHITECTURE : Essential Components



# Related Work





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# Service Abstraction using XML

SERVICE ADVERTISEMENT

## SERVICE DEFINITION

### SERVICE NAME

String      Predefined

### DESCRIPTION

String      Predefined

### SRC ADDRESS

{set}/<range>      Predefined

### DEST ADDRESS

{set}/<range>      Predefined

### SRC ADDRESS SCHEME

{set}/<range>      Predefined

### DEST ADDRESS SCHEME

{set}/<range>      Predefined

### SRC FORMAT

{set}      Predefined

### DEST FORMAT

{set}      Predefined

### SRC FORMAT SCHEME

{set}      Predefined

### DEST FORMAT SCHEME

{set}      Predefined

### CONSIDERATION TYPE

Unique String      Predefined

### CONSIDERATION VALUE

<value>      Predefined

### Provider ID

Unique String      Predefined

### PURCHASE PORTAL

Unique String      Predefined

### PROVISIONING DETAIL

String      Predefined

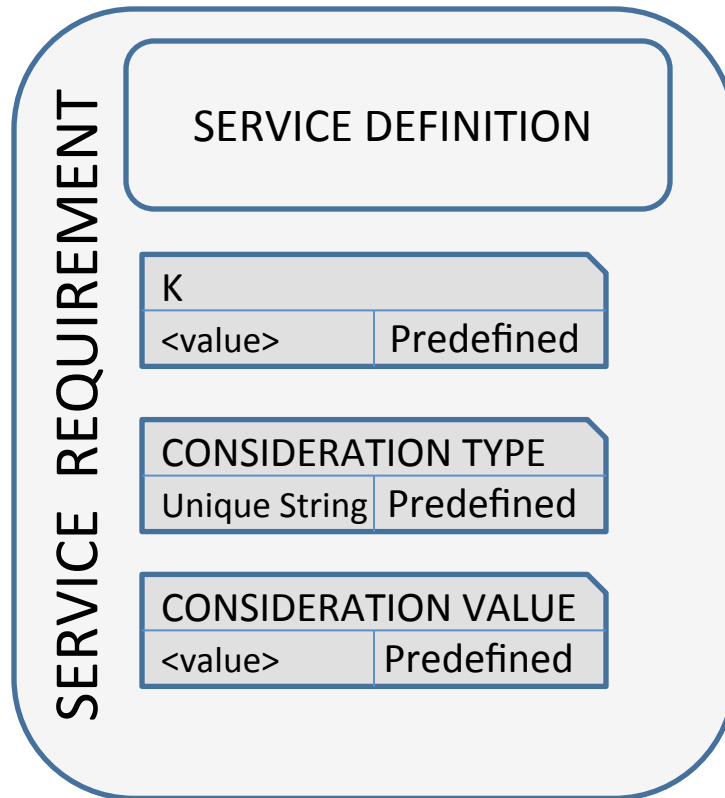
## INDEX

Attribute Name

Value

Semantics

# ChoiceNet Planner - Input



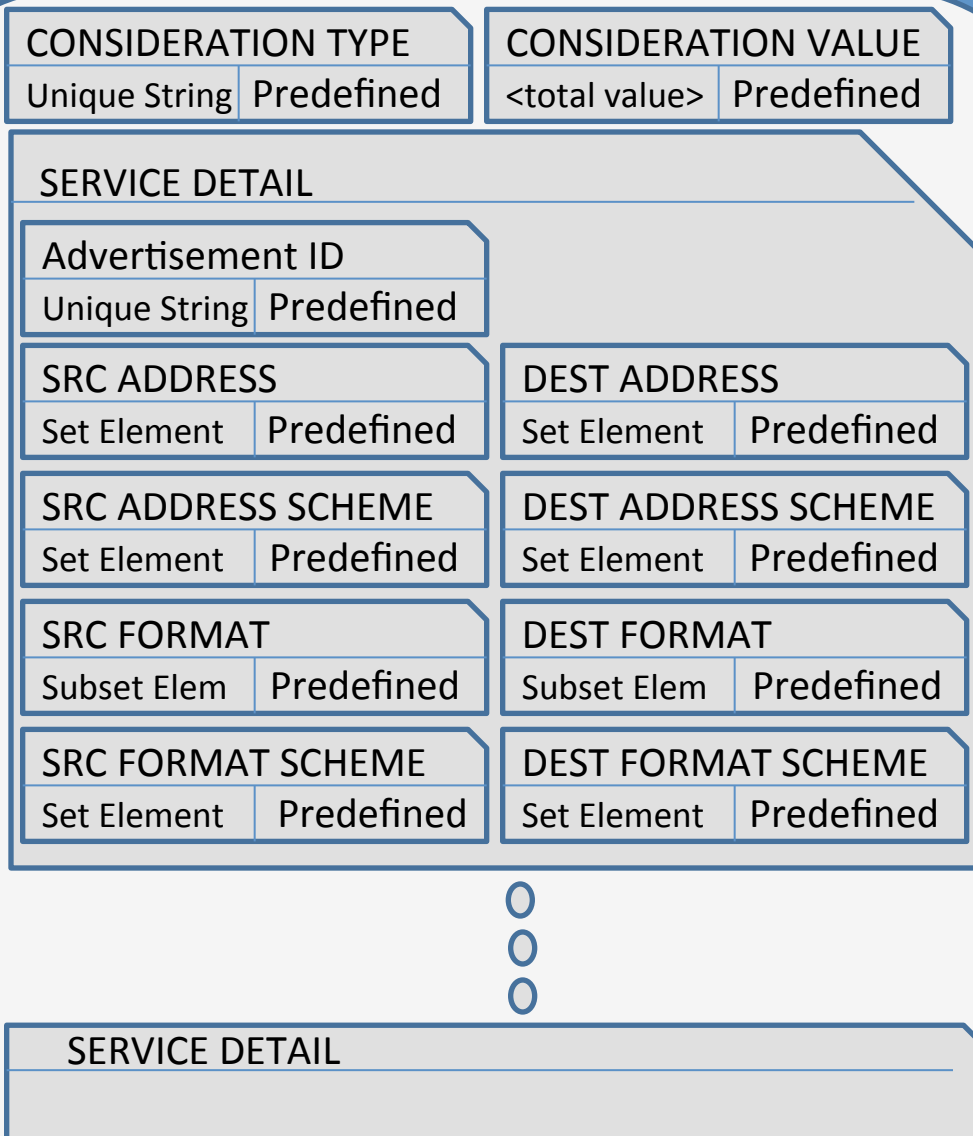
## INDEX

INDEX	
Attribute Name	
Value	Semantics

# ChoiceNet Planner - Output

K COMPOSED SERVICES

COMPOSED SERVICE

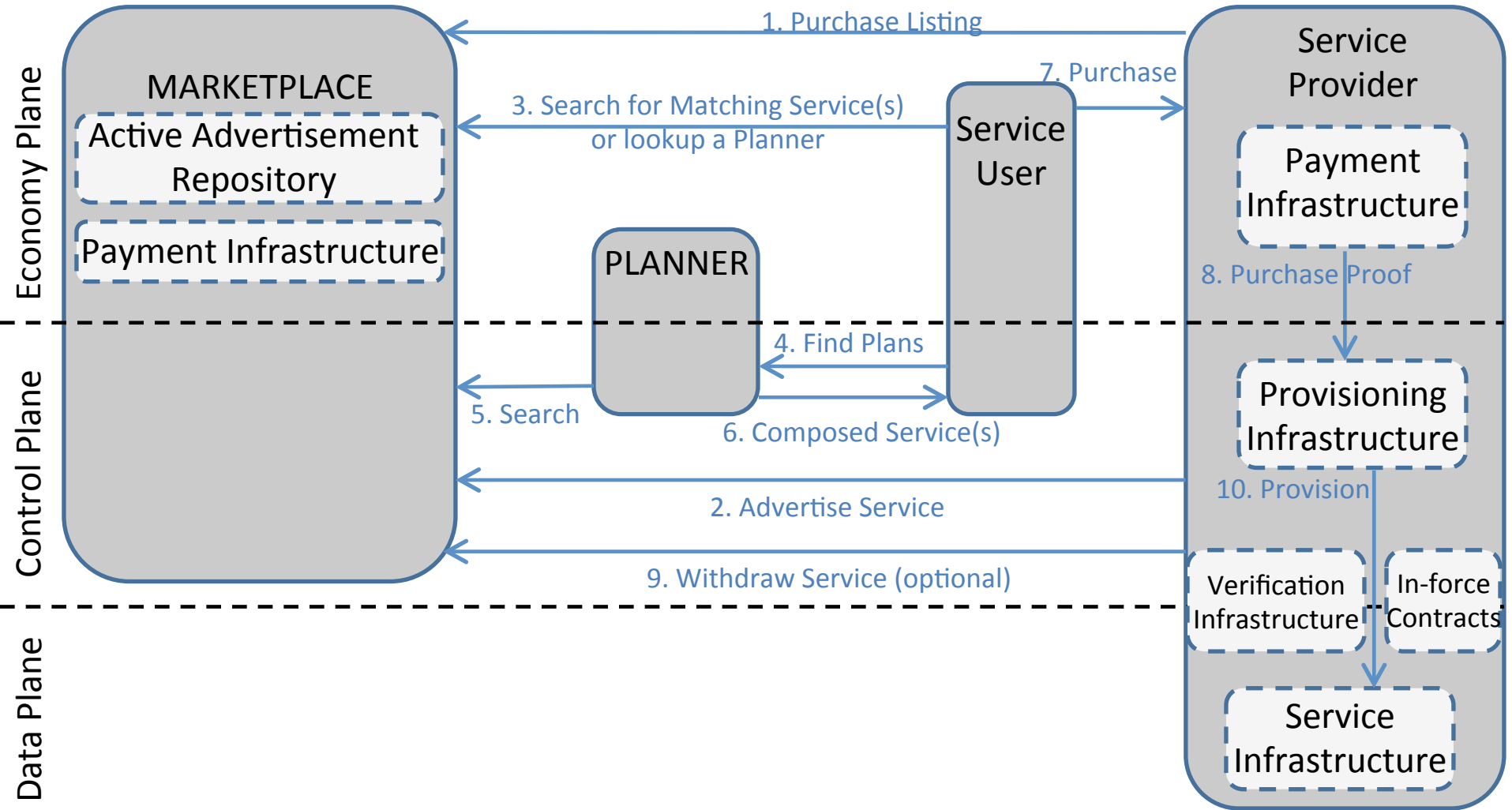


COMPOSED SERVICE

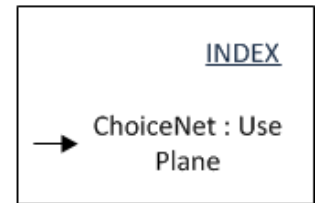
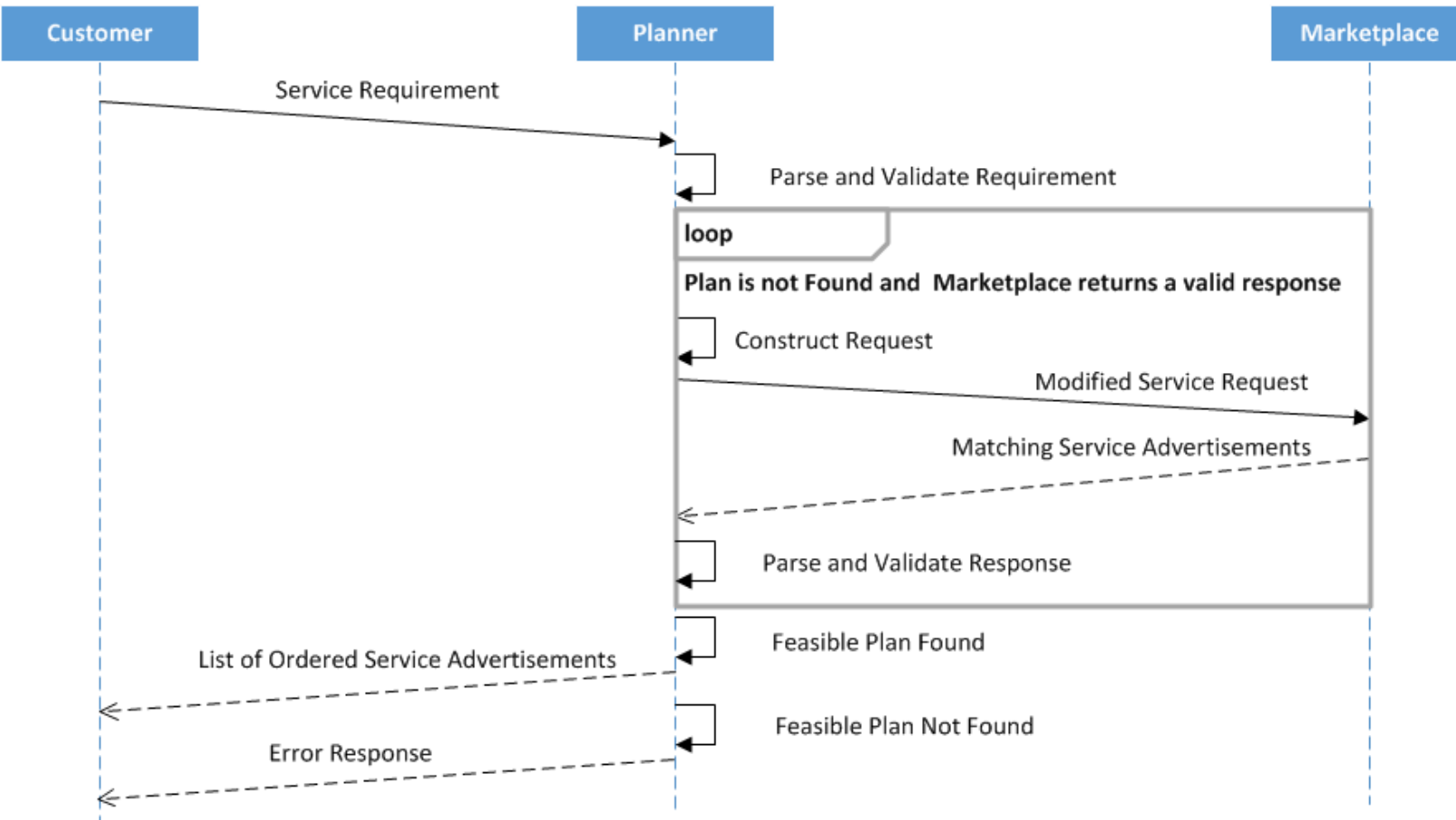
# Design Considerations

- Planner Instantiation
  - Planner integrated inside the Marketplace
  - ✓ Planner which resides outside the Marketplace
- Planner Interaction with Marketplace
  - ✓ Pull System
  - Push System
- Planner Algorithm
  - A cheapest cost composed service using modified Dijkstra's shortest path algorithm
  - ✓ "K" loop less composed services sorted in non decreasing order of cost using modified Yen's algorithm
  - ✓ A node is represented by the tuple (Address, Format)

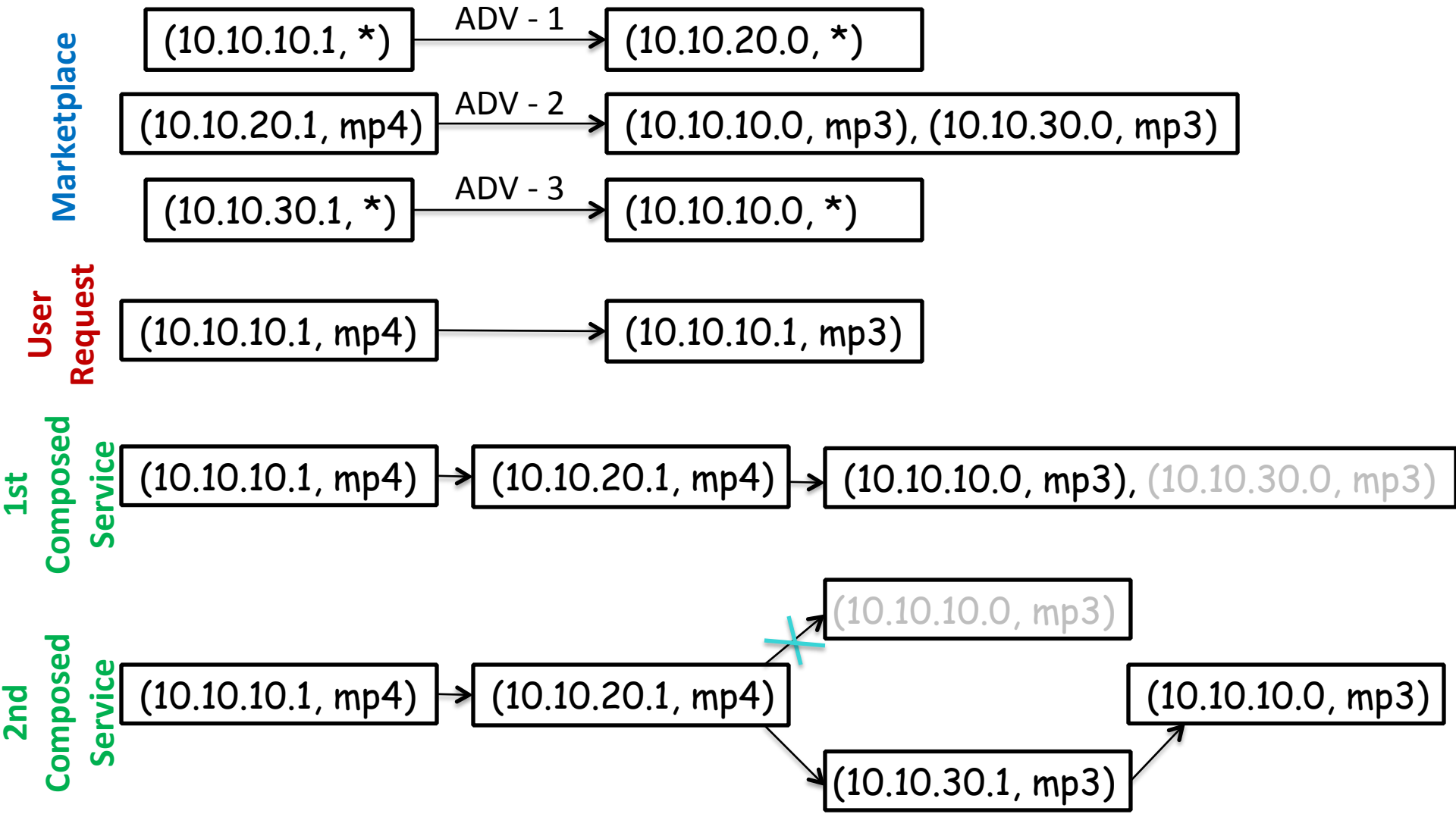
# High Level Entities Interaction Diagram



# Use Plane Protocol Of Planner



# Round Trip Example





# Summary

- Marketplace and Graph Model
- Semantically enriched Network services
- Planner for constructing multiple Composed Services
- Request and Response Automation

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# Current and Future Work

- Planner for users:
  - Pareto paths for multiple objectives
  - Service concatenation routing with NFV applications
- Planner for providers
  - Service placement/Network design
  - Planning based on historical data – static
  - Planning based on current user behavior (dynamic)
  - Scale up or scale down